Communicable Disease Report

Hawai'i Department of Health
Communicable Disease Division

May/June 2000

Beware Hawaiian Critters! Disease Reservoirs and Vectors in Hawai`i

Because of our isolation and being surrounded by a large body of water, the State of Hawai`i has limited exposure to vector-borne diseases. This article summarizes the animal reservoirs and vectors present in the State and the diseases they transmit. It also identifies important vector-borne diseases **not** present in Hawai`i and the reasons they are not here.

The list of reservoirs/vectors highlighted below is not an exhaustive list of species in each taxonomic group present in Hawai`i. Pets and domestic animals as disease reservoirs are not discussed in this article. Rather, the article attempts to provide a framework for understanding the diverse ecology of vector-borne diseases in the State.

Mammalian Reservoirs

Hawai`i has three species of rats, the Norway rat *(Rattus norvegicus)*, the Roof rat *(Rattus rattus)*, and the Polynesian rat *(Rattus exulans)*, and one species of mouse *(Mus domesticus)*. Other potential mammalian reservoirs include the Small Indian mongoose *(Herpestes auropunctatus)*, feral swine and the Hoary bat *(Lasiurus cinereus)*. The diseases they may carry in Hawai`i are noted in Table 1.

Table 1.
Mammalian Disease Reservoirs

Species	Diseases Harbored
Rats and Mice	Leptospirosis
	Salmonellosis
	Murine Typhus
	Giardiasis
	Cryptosporidiosis
Mongooses	Leptospirosis
	Salmonellosis
	Murine Typhus
Feral Swine	Leptospirosis
	Trichinosis*
	Brucellosis**
Hoary Bat	Unknown***

* Endemic in the Hāmākua district of the Big Island.

** Endemic in the Hāmākua and Kona districts of the Big Island, Kahakuloa on Maui, and widespread in the mountains and valleys of O`ahu.

*** On the endangered species list. Seen only at dusk in certain areas.

Hantaviruses are transmitted by mice, but have **not** been associated with the species of mouse present in Hawai`i. The disease has never been diagnosed here. Mongooses and bats are known vectors of rabies in other areas, a disease that has not entered the State by virtue of the Department of Agriculture's animal quarantine program for incoming pets.

Avian Reservoirs

Birds may serve as reservoirs of many diseases, including *Mycobacterium avium-intracellulare* complex, campylobacteriosis, salmonellosis, aspergillosis, psittacosis, ascariasis and toxoplasmosis.

Marine Fish as Toxin Reservoirs

Marine fish in Hawai`i have been implicated in several types of poisoning although they are not known to transmit infectious diseases. **Ciguatera** toxin is produced by a dinoflagellate which makes its way up the marine food chain. People are exposed by eating fish whose habitat includes coral reefs. Many species have been implicated. The fishes most commonly reported include Jacks (Ulu`a and Pāpio), Amberjack (Kāhala) and a Wrasse (Po'ou). Information on a commercially available test that detects ciguatoxin in fish may be accessed on the internet at *http://www.cigua.com.* **Scombroid** poisoning results from eating spoiled fish, primarily tuna, mahimahi and related

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Poliomyelitis Prevention in the United States

As of January 1, 2000, the Advisory Committee on Immunization Practices (ACIP) recommends exclusive use of inactivated poliovirus vaccine (IPV) for routine childhood polio vaccination in the United States. The updated recommendations of the ACIP for Poliomyelitis Prevention in the United States were published in the MMWR, Recommendations and Reports on May 19, 2000. The following article is a condensed version of the ACIP Recommendations.

Summary of Recent Polio Vaccination Policy in the United States

Based on the continued occurrence of vaccine-associated paralytic poliomyelitis (VAPP) in the United States, the absence of indigenous disease, and the sharply decreased risk for wild poliovirus importation into the U.S., in June 1996, the ACIP recommended a change from an all-oral poliovirus vaccine (OPV) schedule for routine childhood poliovirus vaccination to a sequential IPV-OPV schedule (two doses of IPV at ages 2 and 4 months, followed by two doses of OPV at ages 12-18 months and 4-6 years). The sequential schedule was intended to be a transition policy until the eventual adoption of an all-IPV schedule.

Expanded use of IPV was successfully implemented without any observed declines in childhood polio immunization coverage. Also, since 1997, the global polio eradication initiative has progressed rapidly, decreasing the likelihood of poliovirus importation into the U.S. On the basis of these data, in order to eliminate the risk of VAPP while maintaining population immunity, the ACIP recommended that the all-IPV schedule begin January 1, 2000. Although the American Academy of Family Physicians concurred with this recommendation, the American Academy of Pediatrics recommended only that the all-IPV schedule begin during the first 6 months of 2000.

Inactivated Poliovirus Vaccine (IPV)

IPOL® is the only IPV product distributed in the U.S. One dose consists of the sterile suspension of three types of poliovirus, grown on monkey kidney cells. The vaccine is concentrated, purified and formaldehyde inactivated. The vaccine contains 2-phenoxyethanol and formaldehyde as preservatives, as well as trace amounts of neomycin, streptomycin, and polymyxin B used in vaccine production. The vaccine dose not contain thimerosal.

Data from clinical trials have confirmed that 90-100% of children develop protective antibodies to all three types of poliovirus after administration of two doses of IPV, and 99-100% develop protective antibodies after three doses. Results of studies showing long-term antibody persistence after three doses of IPV are not yet available in the U.S. Since expanded use of IPV began in 1996, no serious adverse events have been linked to the use of IPV.

IPV Recommendations

Routine Vaccination

All children should receive 4 doses of IPV at ages 2, 4, 6-18 months and 4-6 years. The first and second doses of IPV are necessary to induce a primary immune response, and the third and fourth doses ensure "boosting" of antibody titers to high levels. If accelerated protection is needed, the minimum interval between doses is 4 weeks, although the preferred interval between the second and third doses is 2 months. All children who have received three doses of IPV before age 4 years should receive a fourth dose before or at school entry. The fourth dose is not needed if the third dose is administered on or after the fourth birthday.

Interchangeability of Vaccines

Children who have initiated the poliovirus vaccination series with one or more doses of OPVshould receive IPVto complete the series. If the vaccines are administered according to their licensed indications for minimum ages and intervals between doses, four doses of OPV or IPV in any combination by age 4-6 years is considered a complete series, regardless of age at the time of the third dose. A minimum interval of 4 weeks should elapse if IPV is administered after OPV. Available evidence indicates that persons primed with OPV exhibit a strong mucosal immunoglobulin A response after boosting with IPV.

Administration with Other Vaccines

IPV can be administered simultaneously with other routinely recommended childhood vaccines, including DTaP, DTP, Hib, Hep B, varicella, and MMR.

Recommendations for IPV Vaccination of Adults

Routine poliovirus vaccination of adults residing in the U.S. is not necessary. Most adults have a minimal risk for exposure to poliovirus in the U.S. and most are immune as a result of vaccination during childhood. Vaccination is recommended for certain adults who are at greater risk for exposure to polioviruses than the general population, including the following persons:

- Travelers to areas or countries where polio is epidemic or endemic;

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Recent Communicable Disease Scientific Publications

In the past year, four articles appearing in scientific journals were authored by staff of the Department of Health's (DOH) Epidemiology and Medical Microbiology Branches.

The September 1999 issue of the *Journal of Clinical Microbiology* published an article entitled **"International Multicenter Evaluation of the Clinical Utility of a Dipstick Assay for Detection of *Leptospira*-Specific Immunoglobulin M Antibodies in Human Serum Specimens,"** authored by 20 people including lead author Henk L. Smits from the Royal Tropical Institute in the Netherlands where the study was conducted, and including DOH employees David M. Sasaki and Harry Y. Domen.[1] A multicenter evaluation of a leptospirosis IgM screening dipstick test showed that sensitivity of the test (compared with the confirmatory Microscopic Agglutination Test) ranged for 60% in acute-phase samples to 87.4% for convalescent samples. Specificity for the two groups were 94 and 93% respectively. The study demonstrated that this easily performed assay is useful for quick screening, has wide applicability in different countries with different degrees of endemicity, and can be used at all levels of the health care system, including field laboratories.

The November 17, 1999 issue of the *Journal of the American Medical Association* published an article entitled **"Statewide System of Electronic Notifiable Disease Reporting from Clinical Laboratories-Comparing Automated Reporting with Conventional Methods"** authored by Paul Effler, Myra Ching-Lee, April Bogard, Man-Cheng Ieong, Trudi Nekomoto and Daniel Jernigan from the DOH Epidemiology Branch in conjunction with the Centers for Disease Control and Prevention.[2] The article showed that electronic laboratory reporting resulted in a 2.3-fold increase in reports, arriving an average of 3.8 days earlier than conventional reports. The estimated completeness of electronic reporting was 80% compared with 38% for the conventional system. The authors concluded that electronic reports were more timely and complete, suggesting that electronic reporting may ultimately facilitate more rapid and comprehensive institution of disease control measures. Appreciation is extended to dedicated staff from information management departments of the following participating laboratories: Francis Chan and Susan Girard at Clinical Laboratories of Hawai`i; Ronald Fox, Clyde Kanemoto and Raymond Yeung at Diagnostic Laboratory Services, Inc.; and Les Chock, Phuong Kamimura, Susana Sum and Robert Young at Kaiser Permanente-Hawai`i Laboratories.

The March 2000 issue of the *Journal of Clinical Microbiology* published a study conducted by the DOH's Epidemiology and Medical Microbiology Branches in conjunction with the Centers for Disease Control and Prevention entitled **"Evaluation of the Indirect Hemagglutination Assay for Diagnosis of Acute Leptospirosis in Hawai`i."** It was authored by Paul V. Effler, Harry Y. Domen, Sandra Bragg, Tin Aye and David M. Sasaki.[3] The study evaluated six years of leptospirosis case data comparing the results of the screening Indirect Hemagglutination Assay (IHA) with that of the confirmatory Microscopic Agglutination Test. The overall sensitivity of the IHA was 41%, while the sensitivity of samples collected within 14 days of illness onset was 15%. The authors recommended availability of other screening tests with higher sensitivities (The IHA is the currently the only FDA-approved screening test for leptospirosis).

In the same issue (March 2000) of the *Journal of Clinical Microbiology,* an article entitled **"Simple Latex Agglutination Assay for Rapid Serodiagnosis of Human Leptospirosis"** was published. There were eight authors, including lead author Henk L. Smits of the Royal Tropical Institute in the Netherlands, and David M. Sasaki from the DOH.[4] A newly developed latex agglutination assay was evaluated with groups of patient samples with and without leptospirosis from Hawaii, the Seychelles, Thailand and the Netherlands. The mean overall sensitivity was 82% and the mean specificity was 95%. They concluded that the test is easy to run and does not require special skills or equipment and is suitable for use as a rapid screening test for leptospirosis.

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Submitted by David M. Sasaki, D.V.M., M.P.H., Veterinary Medical Officer, Epidemiology Branch.

Preparing for the Next Influenza Pandemic Satellite Broadcast with Live Q&A Session

A new Centers for Disease Control and Prevention (CDC) Satellite Course will be offered on Thursday, July 13, 2000 from 7:00-900 A.M. live from seven sites on O`ahu, Hawai`i, Maui and Kaua`i. It will be shown on a one week delayed basis at Kona Community Hospital and Kaua`i Veterans Memorial Hospital. Two hours of CME, CNU and CEU credits will be offered to participants.

More than 20 million people died worldwide from the previously unknown influenza strain called the 1918 "Spanish Flu." The 20th century's other two influenza pandemics caused widespread morbidity and social disruption. Epidemiologists agree that another dangerous new strain of the virus will likely soon emerge.

This live CDC satellite course is designed to encourage participation among federal, state, and local agencies in developing guidelines for influenza pandemic preparedness. Public health experts will discuss ways to handle potential vaccine shortages, triage, and infection control measures, plus strategies to minimize disruption of essential community services. The target audience for this course includes health officers, epidemiologists, emergency preparedness planners, physician and health care organizations, laboratory managers, public information officers, pharmacists, hospital infection control practitioners, members of the media and funeral directors.

The revised edition of the text, Pandemic Influenza, A Planning guide for State and Local Officials, will be distributed at the course sites. Please see attached registration form. For more information, contact Tim Helton at (808) 586-8320 or by e-mail at *tlhelton@mail.health.state.hi.us.*

No Hantavirus Fatality in Hawai`i

The E-mail

In July 1999, an electronic mail message entitled "Rats" began circulating on the internet. It described someone in the United States (U.S.) mainland who had died from drinking a soda without first washing the top of the can. It then proceeded to describe a local Hawai`i man who died from similar circumstances, after cleaning up a storeroom that had rodent droppings. It attributed the patient's attending physician questioning the patient's friend regarding exposure to rodent droppings, and suggested that Hantavirus could have been the source of his illness.

The Department of Health (DOH) received a copy of the e-mail in August. From then to the present, periodic queries have been received from local residents as well as from people on the mainland. Most recently, the e-mail has made its way to staff at the Centers for Disease Control and Prevention (CDC). In response to the concern this e-mail has generated, a brief summary of the facts surrounding the death in Hawai`i is described.

The DOH Investigation

Following the receipt of the initial e-mail, the DOH conducted its own investigation into the circumstances of the patient's illness. The patient was a middle-aged Honolulu man who had cleaned out a retail storeroom on a neighbor island four weeks prior to his illness, and allegedly reported seeing rodent droppings in the storeroom. The onset of his symptoms was in early July, 1999. He presented to a local hospital emergency room with a four day history of fatigue, nausea, non-bloody vomiting and non-bloody diarrhea without fever. A serum sample was submitted to the DOH laboratory for leptospirosis serology. He was diagnosed with hepatic and renal failure and expired late that evening.

An autopsy found no evidence of pathology consistent with hantavirus infection or leptospirosis. The autopsy did identify other illness, but pathologic processes which can account for the patient's illness are no way a threat to the public.

The reservoirs of hantaviruses are rodents. The species of mice that have been associated with severe hemorrhagic disease in the U.S. (pulmonary syndrome) and in Korea (renal syndrome), are not found in Hawai`i. No confirmed diagnosis of hantavirus disease has ever been made in Hawai`i, although patients have periodically been tested for the disease.

Beware the Internet

The internet can be an efficient vehicle for initiating and spreading rumors and misinformation. Recently another similar internet health hoax alleging an association between eating bananas with the development of Group A Streptococcal (GAS) infections (flesh-eating bacteria) has required extensive resources to counter this misinformation. The CDC has initiated an investigation to evaluate the problem and quantify the resources required to correct the misperceptions created regarding GAS disease and its transmission.

Submitted by David M. Sasaki, D.V.M., M.P.H., Veterinary Medical Officer, Epidemiology Branch.

Hawaiian Critters

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pelagic species. Inadequate or delayed refrigeration results in overgrowth of bacteria that produce histamine, saurine and possibly other toxic substances. **Hallucinogenic** poisoning is associated with mullet, goatfish (Weke), rudderfish (Nenue) and surgeon fish (Manini). It is seasonal, occurring usually in the summer and has been reported on Kaua`i, O`ahu and Moloka`i. **Pufferfish** poisoning (tetrodotoxication) may result from eating puffers, blowfish, balloon fish and others. Many species of puffer fish contain at least one very potent toxin, tetrodotoxin. The most common puffer fish *(Arothron hispidus),* or "fugu" has been implicated in at least seven fatalities in Hawai`i.

Crustaceans & Mollusks

Angiostrongylus cantonensis, the rat lungworm, may cause an eosinophilic meningoencephalitis in humans eating uncooked or partially cooked land or freshwater snails, slugs, planarians or prawns, including African snails, apple snails and freshwater prawns. Transmission also occurs from eating unwashed fresh vegetables that the above animals may have contaminated.

Arthropod Vectors

Ticks

There are two species of ticks endemic in Hawai`i, the brown dog tick *(Rhipicephalus sanguineus)* and the cattle ear tick *(Otobius megnini),* neither of which is known to transmit human disease, although cattle ear tick bites have been associated with otoacariasis. On occasion, disease-transmitting tick species, *Dermacentor spp, Amblyomma spp. and Ixodes spp.* have been found on dogs in the animal quarantine station, but have been destroyed. As a result, the following diseases transmitted by these ticks are **not** found in Hawai`i: Rocky Mountain Spotted Fever, Tularemia, Ehrlichiosis and Lyme Disease.

Fleas

There are three species of fleas known to transmit disease in Hawai`i; the oriental rat flea *(Xenopsylla cheopis),* the cat flea *(Ctenocephalides felis),* and the Hawaiian rat flea *(Xenopsylla vexabilis).* All of these species are known to transmit murine typhus. They are also vectors of plague, which was eradicated from the State. The last rodent case of plague was diagnosed in 1957.[1] Several other species of fleas, such as *Echidnophaga gallinacea, Nosopsylla spp. and Leptopsylla spp.* are important vectors of plague and murine typhus in the rat-flea-rat cycles of these diseases.

Mosquitoes

There are currently no mosquito-borne infectious diseases endemic in the State. However, *Aedes aegypti* and *Aedes albopictus* are found in Hawai`i. *Aedes aegypti* is found in pockets in the North and South Kona districts of the Big Island, and pockets on Moloka`i and possibly on Lana`i. *Aedes albopictus* is ubiquitous in its distribution. *Culex quinquefasciatus* is also widespread in Hawai`i. *Anopheles spp.* are **not** found in Hawai`i. As a result, the State is free of malaria.

Because of the mosquito species present here, there are many diseases that could become endemic if they enter the mosquito population. These include yellow fever, dengue fever (previously eradicated), the arthropod-borne viral encephalitides (Eastern equine encephalitis, Venezuela equine encephalitis, Western equine encephalitis, St. Louis encephalitis, West Nile encephalitis and Murray Valley encephalitis) and filariasis.

Other Arthropods

Although the following are not known to transmit specific infectious diseases, there are many centipedes, scorpions and spiders, bees, flies, lice, mites and ants present in the State that may prompt patients to seek medical care for stings and/or bite wounds. These are summarized in Table 2.

Table 2: Biting Arthropods

Group	Species
Spiders	Brown Violin
	Western Black Widow
	Brown Widow
	Yellow Crab Spider
Scorpions	Lesser Brown Scorpion
Centipedes	Large Centipede
Flies*	House Fly
	Dog Dung Fly
	Green Bottle Fly
	Stable Fly
	Horn Fly
	Blow Flies
	Sheep Bot Fly
Cockroaches** #	American Cockroach
	German Cockroach
Lice	Body Louse
	Head Louse
	Crab Louse
Mites	Tropical Fowl Mite
	Tropical Rat Mite
	Northern Fowl Mite
	Grocer's Itch Mite
	Straw Itch Mite
	Human Itch Mite
	European House Dust Mite#
	North American Housedust Mite#
	Baker's Itch Mite
	Copra Itch Mite
Other Biting Bugs	Bed Bug
	Pacific Kissing Bug
	Large Kissing Bug (Triatoma sp.)##
Bees and Wasps	Western Yellow Jacket
	Common Yellow Jacket
	Golden Paper Wasp
	Common Paper Wasp
	Redbrown Paper Wasp
	Honey Bee
	Sonoran Carpenter Bee
	Sweat Bees
Ants	Fire
	Mexican
	Pharaoh
	Glaber

* May be mechanical vectors of infectious diseases such as salmonellosis, shigellosis, hepatitis A, infectious conjunctivitis, whipworms, hookworms, ascaris and tapeworms.

** Have been incriminated as a mechanical vector of salmonellosis.

\# Produce allergens that cause allergies and asthmatic reactions in susceptible individuals.

Vector of Chagas Disease, not found in Hawai`i.

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Poliomyelitis Prevention

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- Members of communities or specific population groups with disease caused by wild polioviruses;
- Laboratory workers who handle specimens that might contain polioviruses;
- Health-care workers who have close contact with patients who might be excreting wild polioviruses; and
- Unvaccinated adults whose children will be receiving OPV.

Unvaccinated adults who are at increased risk should receive a primary vaccination series with IPV. Adults without documentation of vaccination status should be considered unvaccinated. Two doses of IPV should be administered at intervals of 4-8 weeks; a third dose should be administered 6-12 months after the second.

Adults who have had a primary series of OPVor IPVand who are at increased risk can receive another dose of IPV. Available data do not indicate the need for more than a single lifetime booster dose with IPV for adults.

Precautions and Contraindications

IPV precautions and contraindications include:

- Hypersensitivity or anaphylactic reactions to IPV or antibiotics contained in IPV; and
- Pregnancy. Although no adverse effects of IPV have been documented among pregnant women or their fetuses, vaccination of pregnant women should be avoided on theoretical grounds. However, if a pregnant woman is at increased risk for infection and requires immediate protection against polio, IPVcan be administered in accordance with the recommended schedules for adults.

Oral Poliovirus Vaccine Recommendations

Routine production of OPV in the U.S. has been discontinued. An emergency stockpile is maintained for polio outbreak control only.

Recommendations for OPV Vaccination for Outbreak Control

OPV remains the vaccine of choice for mass vaccination to control polio outbreaks. The preference for OPV in an outbreak setting is supported by:

a) higher seroconversion rates after a single dose of OPV compared with a single dose of IPV;
b) a greater degree of intestinal immunity, which limits community spread of wild poliovirus; and
c) beneficial secondary spread of vaccine virus, which improved overall protection in the community.

Recommendations for Other Uses of OPV

For the remaining non-emergency supplies of OPV, only the following indications are acceptable for OPV administration:

- Unvaccinated children who will be traveling in fewer than 4 weeks to areas where polio is endemic. If OPVis not available, IPV should be administered; and
- Children of parents who do not accept the recommended number of vaccine injections. These children can receive OPV only for the third or fourth dose or both. In this situation, health-care providers should administer OPV only after discussing the risk for VAPPwith parents or care givers.

Precautions and Contraindications for OPV vaccination

Precautions and contraindications for OPV vaccination include:

- Hypersensitivity or anaphylactic reactions to OPV;
- Pregnancy; and
- Immunodeficiency (persons with immunodeficiency should not receive OPV; healthy household contacts of person with immunodeficiency should not receive OPV).

If OPV is inadvertently administered to a household contact of an immunodeficient person, the OPV recipient should avoid close contact with the immunodeficient person for approximately 4-6 weeks after vaccination. If this is not feasible, rigorous hygiene and hand washing after contact with feces and avoidance of contact with saliva can be an acceptable but probably less effective alternative. Maximum excretion of vaccine virus occurs within 4 weeks after oral vaccination.

The entire ACIP statement can be viewed, downloaded, and printed at Centers for Disease Control and Prevention's National Immunization Program web site, *http://www2.cdc.gov/mmwr/mmwr_rr.html.*

For further information, please call the Hawai`i Immunization Program at (808) 586-8332 in Honolulu.

REFERENCE

Centers for Disease Control and Prevention. Poliomyelitis Prevention in the United States - Updated Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR,* 2000;49 (No. RR-5):1-38.

Hawaiian Critters

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For more information, please call the Epidemiology Branch at (808) 586-4586 or the Vector Control Branch at (808) 831-6767 in Honolulu.

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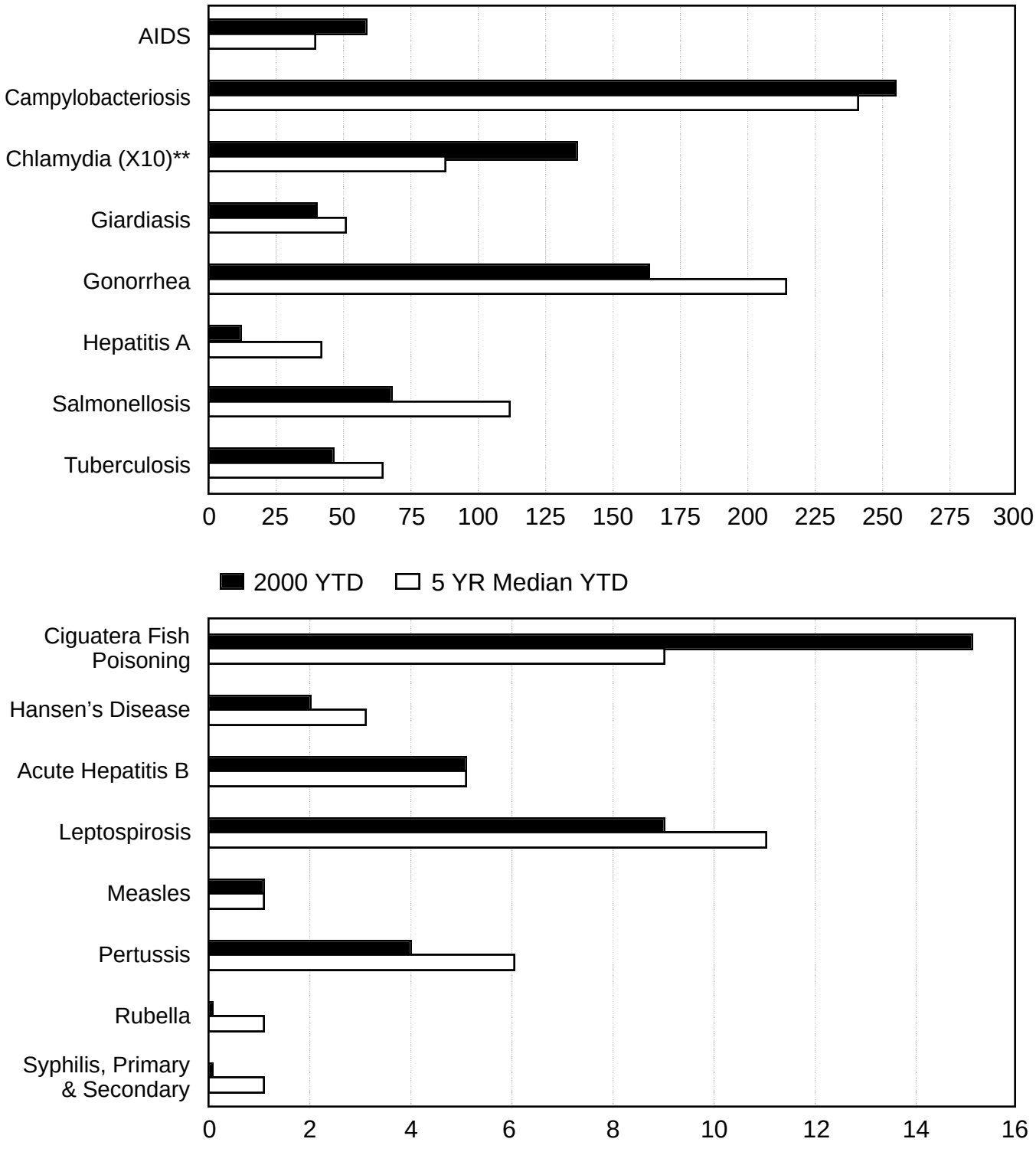
Communicable Disease Surveillance

Selected Diseases by Date of Report*
Hawai‘i, 2000 Year-to-date Through May



* These data do not agree with tables using date of onset or date of diagnosis.
**The number of cases graphed represent 10% of the total number reported.

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Communicable Disease Report

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